DECHLORINATION OF NATIVE PCBS IN KEARNY MARSH SEDIMENTS

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The Kearny Marsh is an approximately 311 acre freshwater impoundment wetland located within the New Jersey Meadowlands. The marsh is a receiving body for landfill leachate and urban surface runoff, resulting in low levels (approximately 2 mg/kg) of polychlorinated biphenyls (PCBs) in the marsh sediment.

Preliminary microcosm studies using Kearny Marsh sediment showed that stimulating the native bacterial population with pentachloronitrobenzene resulted in dechlorination of historical PCBs. The chlorine ions removed from the PCBs were mainly from the para- and meta- positions, suggesting that biological processes were responsible for the dechlorination.

Follow-up microcosm studies are being performed to identify which treatments are most effective in stimulating PCB dechlorination. The microcosms consist of 200 mL of marsh sediment, amended with one or more of the following treatments:

1. A mixture of four organic acids (lactic, propionic, acetic, and butyric acids) to serve as electron donor.
2. A mixture of solvents (methanol, acetone, and 1-butanol), to increase bioavailability
3. tetrachlorobenzene to stimulate dechlorinating bacteria, and
4. Spiking with a non-naturally occurring PCB congener (PCB116) to evaluate the capability of the native microbial community to dechlorinate this model compound

These studies will be followed up by field testing in Kearny Marsh during the spring/summer of 2007. Nine two-foot diameter enclosures were installed in marsh sediments to form “mesocosms” for testing the combined effects of capping with AquaBlok® and the most promising treatments identified in the microcosm studies. The experiments will address the logistics of adding a treatment to sediments beneath a cap, and evaluate the effectiveness of some treatments to enhance *in situ* biotransformation of the native PCBs.